Mathematics –Pink

1. Solution of $e^{\frac{dy}{dx}} = x$, when x=1 and y=0 is
   a. y=x(logx-1)+1
   b. y=x(logx-1)+4
   c. y=x(logx-1)+3
   d. y=x(logx+1)+1

2. If A and B have n elements in common then the number of elements common to A×B and B×A is
   a. 0
   b. n
   c. 2n
   d. n^2

3. The least and the greatest distance of the point (10,7) from the circle $x^2 + y^2 - 4x - 2y - 20 = 0$ are
   a. 5,15
   b. 10,5
   c. 15,20
   d. 12,16

4. Which of the following is false?
   a. Set of even integers is a group under usual addition.
   b. (N, .) is a group.
   c. (N, +) is a semi group.
   d. (Z, +) is a group.

5. If α is a complex number such that $\alpha^2 - \alpha + 1 = 0$, then $\alpha^{2011} =$
   a. 1
   b. −α
   c. α^2
   d. α

6. The locus of the point of intersection of perpendicular tangents to the ellipse is called
   a. Director circle

b. Hyperbola
c. Ellipse
d. Auxiliary circle

7. If a ball is thrown vertically upward and the height 'S' reached in time 't' is given by $S = 22t - 11t^2$, then the total distance travelled by the ball is
   a. 22 units
   b. 44 units
   c. 33 units
   d. 11 units

8. If the points (11,9) , (2,1) and (2,-1) are the midpoints of the sides of the triangle, then the centroid is
   a. (5,3)
   b. (-5,-3)
   c. (5,-3)
   d. (3,5)

9. If f(x) is an even function , then $f'(x)$ is
   a. Nothing can be said
   b. An odd function
   c. An even function
   d. May be even or may be odd

10. If $\vec{i} + \vec{j} - \vec{k}$ *and* $\overrightarrow{2i} - \overrightarrow{3j} + \vec{k}$ are adjacent sides of a parallelogram, then the lengths of its diagonals are
    a. $\sqrt{21}, \sqrt{13}$
    b. $\sqrt{3}, \sqrt{14}$
    c. $\sqrt{13}, \sqrt{14}$
    d. $\sqrt{21}, \sqrt{3}$
11. In a group G={1,2,3,4,5,6} under $\otimes_7$ the solution of 4 $\otimes_7\ x = 5$ is
    a. 5
    b. 3
    c. 2
    d. 4

12. If $x = t^2 + 2 \; and \; y = 2t$ represent the parametric equation of the parabola
    a. $(x-2)^2 = 4y$
    b. $x^2 = 4(y-2)$
    c. $(y-2)^2 = 4x$
    d. $y^2 = 4(x-2)$

13. If A= $\begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $|A^3| = 125$ then α =
    a. ± 1
    b. ± 2
    c. ± 3
    d. ± 5

14. If the determinant of the adjoint of a (real) matrix of order 3 is 25 , then the determinant of the inverse of the matrix is
    a. 0.2
    b. ± 5
    c. $1/\sqrt[5]{625}$
    d. ± 0.2

15. If $\vec{a}$ is a vector perpendicular to both $\vec{b} \; and \; \vec{c}$ then,
    a. $\vec{a} . (\vec{b} \times \vec{c}) = 0$
    b. $\vec{a} \times (\vec{b} \times \vec{c}) = 0$
    c. $\vec{a} \times (\vec{b} + \vec{c}) = 0$
    d. $\vec{a} + (\vec{b} + \vec{c}) = 0$

16. If a tangent is drawn to the circle $2x^2 + 2y^2 - 3x + 4y = 0$ at the point 'A' and it meets the line $x + y = 3$ at B(2,1) , then AB=
    a. $\sqrt{10}$
    b. 2
    c. $2\sqrt{2}$
    d. 0

17. The length of the chord of the circle $x^2 + y^2 + 3x + 2y - 8 = 0$ intercepted by the y-axis is
    a. 3
    b. 8
    c. 9

d. 6

18. The equation of the tangent to the parabola $y^2 = 4x$ inclined at an angle of π/4 to the positive direction of x-axis is
    a. $x + y - 4 = 0$
    b. $x - y + 4 = 0$
    c. $x - y - 1 = 0$
    d. $x - y + 1 = 0$

19. The value of $\tan^{-1}(\frac{x}{y}) - \tan^{-1}(\frac{x-y}{x+y}), x, y > 0$ is
    a. π/4
    b. −π/4
    c. π/2
    d. −π/2

20. If $f(x) = \begin{cases} 2a - x, \text{ when } -a < x < a \\ 3x - 2a, \text{ when } x \geq a \end{cases}$
    then which of the following is true?
    a. f(x) is not differentiable at $x = a$
    b. f(x) is discontinuous at $x = a$
    c. f(x) is continuous for all $x < a$
    d. f(x) is differentiable for all $x \geq a$

21. The function $f(x) = \frac{x}{3} + \frac{3}{x}$ decreases in the interval
    a. $(-3,3)$
    b. $(-\infty, 3)$
    c. $(3, \infty)$
    d. $(-9,9)$
22. The area bounded by the curve $y = \sin\frac{x}{3}$, x-axis and lines $x = 0$ and $x = 3\pi$ is
    a. 9
    b. 0
    c. 6
    d. 3

23. If $\frac{(x+1)^2}{(x^3+x)} = \frac{A}{x} + \frac{Bx+C}{x^2+1}$, then $\sin^{-1} A + \tan^{-1} B + \sec^{-1} C =$
    a. π/2
    b. π/6

c. 0
d. 5π/6

24. The range of the function $f(x) = \sin[x], \frac{-x}{4} < x < \frac{x}{4}$, where $[x]$ denote the greatest integer $\leq x$ is ,
   a. { 0 }
   b. { 0,-1 }
   c. { 0,±sin1 }
   d. { 0, -sin1 }

25. $\log(\sin 1°) \times \log(\sin 2°) \times \log(\sin 3°) \times \ldots \times \log(\sin 179°)$
   a. is positive
   b. is negative
   c. lies between 1 and 180
   d. is zero

26. If $y = (\tan^{-1} x)^2$, then $(x^2+1)^2 y_2 + 2x(x^2+1)y_1$ is equal to
   a. 4
   b. 0
   c. 2
   d. 1

27. Which of the following is not a correct statement?
   a. Mathematics is interesting
   b. $\sqrt{3}$ is a prime
   c. $\sqrt{2}$ is irrational
   d. The sun is a star

28. If $f(x) = f(\pi + e - x)$ and $\int_e^\pi f(x)dx = \frac{2}{e+\pi}$, then $\int_e^\pi xf(x)dx$ is equal to
   a. $\pi - e$
   b. $\frac{\pi+e}{2}$
   c. 1
   d. $\frac{\pi-e}{2}$

29. The value of $\sin(2\sin^{-1} 0.8)$ is equal to
   a. 0.48
   b. $\sin 1.2°$

c. $\sin 1.6°$

d. 0.96

30. The symmetric part of the matrix A= $\begin{bmatrix} 1 & 2 & 4 \\ 6 & 8 & 2 \\ 2 & -2 & 7 \end{bmatrix}$ is

a. $\begin{bmatrix} 0 & -2 & -1 \\ -2 & 0 & -2 \\ -1 & -2 & 0 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 4 & 3 \\ 2 & 8 & 0 \\ 3 & 0 & 7 \end{bmatrix}$

c. $\begin{bmatrix} 0 & -2 & 1 \\ 2 & 0 & 2 \\ -1 & 2 & 0 \end{bmatrix}$

e. $\begin{bmatrix} 1 & 4 & 3 \\ 4 & 8 & 0 \\ 3 & 0 & 7 \end{bmatrix}$

31. A gardener is digging a plot of land. As he gets tired, he works more slowly. After t minutes, he is digging at a rate of $^{2}/_{\sqrt{t}}$ sq.mts. per minute. How long will it take him to dig an area of 40 sq. mts.?

a. 100 min

b. 10 min

c. 30 min

d. 40 min

32. The angle between two diagonals of a cube is

a. $cos^{-1}(\frac{1}{3})$

b. 30°

c. $cos^{-1}(\frac{1}{\sqrt{3}})$

d. 45°

33. In a triangle ABC, $a(b\ cos\ C - c\ cos\ B)$=

a. 0

b. a^2

c. $b^2 - c^2$

d. b^2

34. If α and β are two different complex numbers with $|\beta| = 1$,then$\left|\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$ is equal to

a. 1/2

b. 0

c. -1

d. 1

35. A straight line passes through the points (5,0) and (0, 3). The length of the perpendicular from the point (4,4) on the line is

a. ${}^{15}/_{\sqrt{34}}$

b. ${}^{\sqrt{17}}/_{2}$

c. ${}^{17}/_{2}$

d. $\sqrt{{}^{17}/_{2}}$

36. If the coefficient of variation and standard deviation are 60 and 21 respectively, the arithmetic mean of the distribution is

a. 60

b. 30

c. 35

d. 21

37. A man takes a step forward with probability 0.4 and one step backward with probability 0.6. The probability that at the end of eleven steps he is one step away from the starting point is

a. $11C_6 \times (0.24)^5$

b. $11C_6 \times (0.72)^6$

c. $11C_5 \times (0.48)^5$

d. $11C_5 \times (0.12)^5$

38. Area bounded by $y = x^3, y = 8$ and $x = 0$ is

a. 14 sq. units

b. 6 sq. units

c. 2 sq. units

d. 12 sq. units

39. A balloon which always remains spherical is being inflated by pumping in 10 cubic centimeters of gas per second. Find the rate at which the radius of the balloon is increasing when the radius is 15 cm.

a. $\frac{1}{9\pi}$ cm/sec

b. $\frac{1}{\pi}$ cm/sec

c. $\frac{1}{90\pi}$ cm/sec

d. $\frac{1}{30\pi}$ cm/sec

40. If 1, ω, ω^2 are the three cube roots of unity, then $(1 - \omega + \omega^2)(1 + \omega - \omega^2)$is

a. 2

b. 4

c. 1

d. 3

41. The remainder obtained when $1! + 2! + 3! + .. + 11!$ is divided by 12 is

a. 8

b. 6

c. 9

d. 7

42. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 = 2$

a. cut at right angles

b. cut at angle $^{\pi}/_{4}$

c. touch each other

d. cut at angle $^{\pi}/_{3}$

43. If $sin\, x + sin\, y = 1/2$ and $cos\, x + cos\, y = 1$, then $tan(x + y) =$

a. $-3/4$

b. 4/3

c. 8/3

d. $-8/3$

44. Let $f: R \rightarrow R$ be defined by $f(x) = \frac{1}{x}\ \forall x \in R,$ then f is

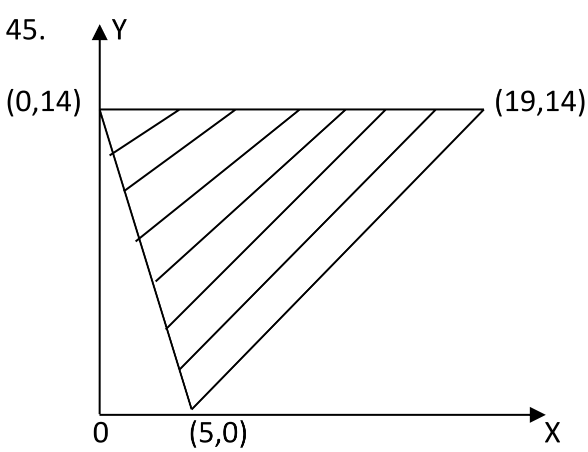
a. onto

b. not defined

c. one-one

d. bijective

45.



The shaded region shown in figure is given by the inequation

$a.$ $14x + 5y \geq 70, y \leq 14$ and $x - y \geq 5$

b. $14x + 5y \geq 70, y \geq 14$ and $x - y \geq 5$

c. $14x + 5y \geq 70, y \leq 14$ and $x - y \leq 5$

d. $14x + 5y \leq 70, y \leq 14$ and $x - y \geq 5$

46. If $x = acos\ ^3\theta,\ y = a\ sin^3\theta$ then $1 + \left(\frac{dy}{dx}\right)^2$ is

a. $\tan^2\theta$

b. 1

c. tan θ

d. $sec^2\theta$

47. Let A and B be two sets containing four and two elements respectively. Then the number of subsets of the set $A \times B$ each having at least three elements is:

a. 275 b. 510

c. 219 d. 256

48. The number of integers greater than 6000 that can be formed using the digits 3,5,6,7 and 8 without repetition is

a. 120

b. 72

c. 216

d. 192

49. The normal to the curve $x^2 + 2xy - 3y^2$at (1,1)

a. meets the curve again in the first quadrant

b. meets the curve again in the fourth quadrant

c. does not meet the curve again

d. meets the curve again in the second quadrant

50. The mean of the data set comprising of 16 observations is 16. If one of the observations valued 16 is deleted and three new observations valued 3,4 and 5 are added to the data, then the mean of the resultant data is

a. 15.8

b. 14.0

c. 16.8

d. 16.0

51. The integral $\int_2^4 \frac{\log x^2}{\log x^2 + \log(36-12x+x^2)} dx$ is equal to

a. 1

b. 6

c. 2

d. 4

52. If 12 identical balls are to be placed in 3 identical boxes then the probability that one of the boxes contains exactly 3 balls is:

a. $220\left(\frac{1}{3}\right)^{12}$

b. $22\left(\frac{1}{3}\right)^{11}$

c. $\frac{55}{3}\left(\frac{2}{3}\right)^{11}$

d. $55\left(\frac{2}{3}\right)^{10}$

53. If n is an even positive integer, then the condition that the highest degree term in the expansion of $(1+x)^n$ may have the greatest coefficient is

a. $\frac{n}{n+2} < x < \frac{n+2}{n}$

b. $\frac{n+1}{n} < x < \frac{n}{n+1}$

c. $\frac{n}{n+4} < x < \frac{n+4}{4}$

d. none of these

54. One factor of $\begin{bmatrix} a^2+x & ab & ac \\ ab & b^2+x & cb \\ ca & cb & c^2+x \end{bmatrix}$ is

a. x^2

b. $(a^2 + x)(b^2 + x)(c^2 + x)$

c. $1/x$

d. none of these

55. If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide, then the value of b^2 is

a. 1

b. 5

c. 7

d. 9

56. The greatest and least values of $(sin^{-1}x)^3 + (cos^{-1}x)^3$ are

a. $-\frac{\pi}{2}, \frac{\pi}{2}$

b. $-\frac{\pi^3}{8}, \frac{\pi^3}{8}$

c. $-\frac{\pi^3}{32}, \frac{7\pi^3}{8}$

d. none of these

57. The equations of the common tangents to $y^2 = 4ax$ and $(x + a)^2 + y^2 = a^2$ are

a. $y = \frac{x}{\sqrt{3}} + a$

b. $y = \pm(\sqrt{3x} + \frac{a}{\sqrt{3}})$

c. $y = \pm(\frac{x}{\sqrt{3}} + \sqrt{3}a)$

d. none of these

58. Two circles $x^2 + y^2 = 6$ and $x^2 + y^2 - 6x + 8 = 0$ are given. Then the equation of the circle through the points of intersection of the two given circles and the point $(1,1)$ is

a. $x^2 + y^2 - 6x + 4 = 0$

b. $x^2 + y^2 - 3x + 1 = 0$

c. $x^2 + y^2 - 4y + 2 = 0$

d. none of these

59. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 + bx + c = 0$, then

a. $(a-c)^2 = b^2 - c^2$

b. $(a-c)^2 = b^2 + c^2$

c. $(a+c)^2 = b^2 - c^2$

d. $(a+c)^2 = b^2 + c^2$

60. $\int_0^{\pi/2} [f(x) + f'(x)]dx =$

a. $\pi/2$

b. $-\pi$

c. π

d. 0

Answers Mathematics – Pink

1- a
2- d
3- a
4- b
5- d
6- a
7- d
8- a
9- b
10- a
11- b
12- d
13- c
14- d
15- b
16- b
17- d
18- d
19- a
20- a
21- a
22- c
23- d
24- d
25- d
26- c
27- b
28- c
29- d
30- d
31- a
32- a
33- c
34- d
35- d
36- c
37- a
38- d
39- c
40- b
41- c
42- a
43- b
44- b
45- c
46- d
47- c
48- d
49- b
50- b
51- a
52- None
53- a
54- a
55- c
56- c
57- c
58- b
59- d
60- c